IN THE CLAIMS

No amendments have been made to the claims. The following claim listing is provided for the convenience of the Examiner.

1. (Original) A method of forming a copper damascene structure, comprising:

forming a first opening through a first insulating layer;

forming a second opening through a second insulating layer which is provided over the first insulating layer, the first opening being in communication with the second opening;

forming a tungsten-nitride (WN2) layer in contact with the first and second openings; and

providing a copper layer in the first and second openings using a selective electroless deposition technique.

2. (Original) The method of claim 1, wherein the first insulating layer includes oxide material.

3. (Previously Presented) The method of claim 1, wherein the first insulating layer includes a material selected from the group consisting of polyimide, spin-on-polymers, flare, polyarylethers, parylene, polytetrafluoroethylene, benzocyclobutene, a spin-on low-k dielectric resin, fluorinated silicon oxide, hydrogen silsesquioxane and a porous siloxane-based polymer.

4. (Original) The method of claim 1, wherein the first insulating layer is formed by deposition to a thickness of about 2,000 to 15,000 Angstroms.

5. (Original) The method of claim 4, wherein the first insulating layer is formed by deposition to a thickness of about 6,000 to 10,000 Angstroms.

6. (Original) The method of claim 1, wherein the second insulating layer includes oxide material.

7. (Previously Presented) The method of claim 1, wherein the second insulating layer includes a material selected from the group consisting of polyimide, spin-on-polymers, flare, polyarylethers, parylene, polytetrafluoroethylene, benzocyclobutene, a spin-on low-k dielectric resin, fluorinated silicon oxide, hydrogen silsesquioxane and a porous siloxane-based polymer.

8. (Original) The method of claim 1, wherein the second insulating layer is formed by deposition to a thickness of about 2,000 to 15,000 Angstroms.

9. (Original) The method of claim 8, wherein the second insulating layer is formed by deposition to a thickness of about 6,000 to 10,000 Angstroms.

10. (Original) The method of claim 1, wherein the first and second insulating layers are formed of same material.

11. (Original) A method of forming a copper damascene structure, comprising:

forming a first opening through a first insulating layer;

forming a second opening through a second insulating layer which is provided over the first insulating layer, the first opening being in communication with the second opening;

forming a tungsten-nitride (WN2) layer using atomic layer deposition such that the tungsten-nitride (WN2) layer is in contact with the first and second openings; and

providing a copper layer in the first and second openings using a selective electroless deposition technique.

12. (Original) The method of claim 11, wherein forming a tungsten-nitride (WN2) layer using atomic layer deposition includes forming a tungsten-nitride (WN2) layer which has a thickness of less than five atomic layers.

13. (Original) The method of claim 11, wherein the tungsten-nitride (WN2) layer is deposited at a temperature of about 600-800 Kelvin.

14. (Original) The method of claim 11, wherein the copper layer is selectively deposited at a temperature of about 300°C to about 400°C.

15. (Original) The method of claim 11, wherein the copper layer is selectively deposited by an electroless plating deposition technique which includes the use of noble metal seeding using copper, gold, palladium, or platinum.

16. (Original) The method of claim 11, wherein the copper layer is selectively deposited by wet activation of surfaces using a contact displacement method, wherein the contact displacement copper deposition is used to first selectively activate the tungsten-nitride (WN2) layer after which selective electroless copper deposition is employed to obtain the copper layer.

17. (Original) The method of claim 11, wherein the method further includes using a chemical mechanical polishing technique to remove the tungsten-nitride (WN2) layer from a top surface of the second insulating layer prior to providing a copper layer in the first and second openings.

18. (Original) The method of claim 11, wherein the method further includes using a chemical mechanical polishing technique to remove the copper layer from a top surface of the second insulating layer.

19. (Original) A method of forming a copper damascene structure, comprising:

forming a first opening through a first insulating layer;

forming a second opening through a second insulating layer which is provided over the first insulating layer, the first opening being in communication with the second opening;

forming a tungsten-nitride (WN2) layer, which is less than five atomic layers thick, using atomic layer deposition such that the tungsten-nitride (WN2) layer is in contact with the first and second openings, and wherein the tungsten-nitride (WN2) layer is deposited at a temperature of about 600-800 Kelvin; and

providing a copper layer in the first and second openings using a selective electroless deposition technique.

20. (Original) The method of claim 19, wherein the copper layer is selectively deposited at a temperature of about 300°C to about 400°C.

21. (Original) The method of claim 19, wherein the copper layer is selectively deposited by an electroless plating deposition technique which includes the use of noble metal seeding using copper, gold, palladium, or platinum.

22. (Original) The method of claim 19, wherein the copper layer is selectively deposited by wet activation of surfaces using a contact displacement method, wherein the contact displacement copper deposition is used to first selectively activate the tungsten-nitride (WN2) layer after which selective electroless copper deposition is employed to obtain the copper layer.

23. (Original) The method of claim 19, wherein the method further includes using a chemical mechanical polishing technique to remove the tungsten-nitride (WN2) layer from a top surface of the second insulating layer prior to providing a copper layer in the first and second openings.

24. (Original) The method of claim 19, wherein the method further includes using a chemical mechanical polishing technique to remove the copper layer from a top surface of the second insulating layer.

25. (Original) A method of forming a copper damascene structure, comprising:

forming a first opening through a first insulating layer;

forming a second opening through a second insulating layer which is provided over the first insulating layer, the first opening being in communication with the second opening;

forming a tungsten-nitride (WN2) layer, which is less than five atomic layers thick, using atomic layer deposition such that the tungsten-nitride (WN2) layer is in contact with the first and

second openings, and wherein the tungsten-nitride (WN2) layer is deposited at a temperature of about 600-800 Kelvin; and

providing a copper layer in the first and second openings using a selective electroless deposition technique at a temperature of about 300°C to about 400°C.

26. (Original) The method of claim 25, wherein the copper layer is selectively deposited by an electroless plating deposition technique which includes the use of noble metal seeding using copper, gold, palladium, or platinum.

27. (Original) The method of claim 25, wherein the copper layer is selectively deposited by wet activation of surfaces using a contact displacement method, wherein the contact displacement copper deposition is used to first selectively activate the tungsten-nitride (WN2) layer after which selective electroless copper deposition is employed to obtain the copper layer.

28. (Original) The method of claim 25, wherein the method further includes using a chemical mechanical polishing technique to remove the tungsten-nitride (WN2) layer from a top surface of the second insulating layer prior to providing a copper layer in the first and second openings.

29. (Original) The method of claim 25, wherein the method further includes using a chemical mechanical polishing technique to remove the copper layer from a top surface of the second insulating layer.

30. - 65. (Canceled)